WHAT IS CLAIMED IS:

1. A zirconium alloy comprising Nb 0.05-0.4 wt%, Sn 0.3-0.7 wt%, Fe 0.1-0.4 wt%, Cu 0.01-0.2 wt%, Si 80-120 ppm, O 600-1400 ppm and Zr the balance.

2. The zirconium alloy according to claim 1, wherein Nb+Sn is added in an amount of 0.35-1.0 wt%.

3. The zirconium alloy according to claim 1, comprising Nb 0.2 wt%, Sn 0.5 wt%, Fe 0.2 wt%, Cu 0.1 wt%, Si 100 ppm, O 1200 ppm and Zr the balance.

4. The zirconium alloy according to claim 1, further comprising Cr 0.05-0.2 wt%.

5. The zirconium alloy according to claim 4, wherein Nb+Sn is added in the amount of 0.35-1.0 wt%.

6. The zirconium alloy according to claim 4, comprising Nb 0.2 wt%, Sn 0.5 wt%, Fe 0.3 wt%, Cr 0.15 wt%, Cu 0.1 wt%, Si 100 ppm, O 1200 ppm and Zr the balance.

7. A method for preparing a nuclear fuel cladding tube by the zirconium alloy, comprising the steps of:

melting a metal mixture comprising of zirconium and alloying elements to obtain a ingot (step 1);

forging the ingot at β phase range (step 2);

β-quenching the forged ingot at 1015-1075 °C (step 3);

hot-working the quenched billet at 600-650 °C (step 4);

cold-working the hot-worked ingot in three to five times, with intermediate vacuum annealing at 550-640 °C (step 5); and

final annealing the cold-worked billed at 460-540 °C (step 6).

8. The method according to claim 7, wherein the hot-working step is carried out at 630 °C.

9. The method according to claim 7, wherein the intermediate vacuum annealing step is performed at 570-610 °C for 2-3 hours.

10. The method according to claim 7, wherein the final vacuum annealing step is performed at 470-520 °C.